REMARKS

The Examiner rejected Claims 1-20 under 35 U.S.C. § 103 "as being unpatentable over Kimble et al. (US 4,200,399) in view of Oehler et al. (US 4,740,086)." Specifically, the Examiner asserted that: .

> Regarding claims 1 and 11, Kimble et al (of record) discloses a resonant optoacoustic spectroscopy apparatus which has all the features of the present invention except for the use of an acoustic pressure attenuating element through which the sensing volume of a photoacoustic detector is in fluid connection with the environment such that the analyte gas can diffuse into the sensing volume through the acoustic pressure attenuating element; however, such a feature is known in the art as taught by Oehler et al. Oehler et al (of record), from the same field of endeavor, teaches the "use of an acoustic pressure attenuating element (52') through which the sensing volume of a photoacoustic detector (35) is in fluid connection with the environment such that the analyte gas can diffuse into the sensing volume through the acoustic pressure attenuating element" (column 5, lines 56-60 and figure 9). It would have been obvious to one having ordinary skill in the art at the time the invention was made to rearrange the optical elements of Kimble et al as taught by Oehler et al. The rationale for this modification would have arisen from the fact that using such arrangement would allow the gas exchange to take place between the gas collecting point and the photoacoustic gas detector, purely passively by gas diffusion through the diaphragm, instead of requiring a pump.
>
> Regarding claims 2 and 12; Kimble et al teaches that the gas flow into the resonant cavity volume have [sic]to be small in order for this volume not to have any affect, thus, it would have been obvious to use a capillary tube instead of the opening (36) of Kimble because they both function in the same manner.
>
> Regarding claims 3-5 and 13-15, see figure 9 of Oehler et al for the use of microphone (36) which connected to the detector volume (35') through a small channel, in close proximity to the acoustic pressure attenuating element (52').
>
> Regarding claims 6, 7, 16, and 17; see column 3, lines 28-29 of Kimble et al for the diffusion rate.
>
> Regarding claims 8 and 18, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a rigid

membrane mounted to a flexible support, instead of a flexible membrane because they are [sic] function in the same manner.

Regarding claims 9, 10, 19 and 20; it would have been obvious to made [sic] the sensing volume and pressure sensor volume equal in size for the purpose of determining the initial response time (see column 3, lines 11-6 of Kimble et al).

The Examiner has alleged that Kimble et al. discloses a resonant optoacoustic spectroscopy apparatus which has all the features of the present invention except for the use of an acoustic pressure attenuating element through which the sensing volume of a photoacoustic detector is in fluid connection with the environment such that the analyte gas can diffuse into the sensing volume through the acoustic pressure attenuating element. This is simply not the case. The Examiner has ignored specific features of the claimed invention which are not found, disclosed or taught in either Kimble et al. or Oehler et al.

Initially, it must be noted that Kimble et al. discloses a forced flow or pumped system (resonant) whereas Oehler et al. discloses a diffusion system (nonresonant) having an acoustic pressure attenuating element. The Examiner has presented no teaching or basis for his assertion that components such as the acoustic pressure attenuating element are interchangeable between resonant and nonresonant systems. See Ex Parte Chicago Rawhide Mfg. Co., 223 USPQ 351, 353 (P.O. Bd. Appls 1984) ("The prior art must provide a motivation or reason for a worker in the art, without the benefit of appellant's specification, to make the necessary changes in the reference device."). Moreover, the Examiner's assertion that Kimble "teaches that the gas flow into the resonant cavity volume [has] to be small in order for this volume not to have any affect" is contrary to the specific teaching in Kimble of a gas flow of 100 cubic centimeters per second. This gas flow is several orders of magnitude larger than the diffusion flow of Oehler et al. Indeed, Kimble is not even concerned about the size of opening 36 because at flow rates of 100 cubic centimeters per second, the gas has no difficulty getting into and filling

the resonant cavity 34. This is not the case in the diffusion (nonresonant) system of Oehler et al.

Additionally, Kimble et al. teaches that the absorption cell is coupled to the acoustic cavity through an opening 36 which may be uncovered as shown in Figure 2 or covered by a thin membrane or diaphragm. As the Examiner admits, there is no teaching in Kimble et al. that this opening or connection is a capillary tube as is now claimed in Claim 1. Similarly, Oehler et al. does not show or teach a capillary tube, let alone a separate acoustic pressure sensor volume. The Examiner cannot simply ignore these teachings and limitations. See Ex Parte Murphy and Burford, 217 USPQ 479, 481 (P.O. Bd. Appls. 1982) ("it is error to ignore specific limitations distinguishing over the reference"); In re Boe, 505, F.2d 1297, 184 USPQ 38 (CCPA 1974). Similarly, Kimble teaches that the acoustic resonant cavity 34 is much larger than the absorption cell 30. Indeed, Kimble et al. teaches that the ratio of the volume of the acoustic resonant cavity 34 to the absorption cell 30 is 500:1 (see Col. 3, lines 6-43 and Col. 4, lines 1-8). In no way can this be said to teach that the two volumes are similar in size as is now set forth in Claim 11 of the present invention.

Claim 17 has been amended to state that the flexible membrane is gas permeable and Claim 18 has been amended to state that the rigid membrane has a hole therein to permit steady-state pressure equalization. The only membrane that Kimble et al. discloses is a Mylar film. Mylar is certainly not gas permeable and indeed it is not even rigid. Moreover, there is no disclosure of a hole in the Mylar membrane of Kimble et al. or that it is gas permeable and indeed, such a modification would be contrary to Kimble et al. which specifically teaches the use of the Mylar membrane with a special gas (for example Xenon) in the acoustic chamber to provide a gain in sensitivity. If the flexible membrane of Kimble et al. were gas permeable, or if it were a rigid membrane with a hole therein, the Xenon gas would leak out and the gain in sensitivity would be lost. Such a modification, contrary to the express teaching of Kimble et al.,

is thus improper. See Schenk v. Nortron, 218 USPQ 698, 702 (Fed. Cir. 1983) ("Modification unwarranted by the disclosure of a reference is improper.").

In view of the above amendments and remarks, Applicant respectfully requests the Examiner withdraw his rejection of Claims 1, 3-6, 9-18 and 20 under 35 U.S.C. § 103, indicate the allowability of Claims 1, 3-6, 9-18 and 20, and that an official Notice of Allowance be issued in due course.

Respectfully submitted,

James G. Uber
Reg. No. 30,600

Mine Safety Appliances Company
P.O. Box 426
Pittsburgh, PA 15230
412-967-3215 (phone)
412-967-3309 (fax)